OUTLINE SHEET 4-5-1
Hazardous Materials

A. Introduction

Maintenance of shipboard equipment have made it necessary to use hazardous materials. The shipboard engineer must know how to identify hazardous material labeling and practice the safety precautions associated with it.

B. Enabling Objectives

4.12 **IDENTIFY** labels and categories of hazardous material labels.

4.13 **DESCRIBE** the safety precautions used in the vicinity of hazardous material.

4.14 **DESCRIBE** the information that can be found on material safety data sheets.

C. Topic Outline

1. Introduction
2. Overview
3. Categories of Materials
4. Precautionary Labels
5. National Fire Protection Diamond
6. Warning Signs
7. Material Safety Data Sheet
8. Hazardous Material Storage
9. Summary and Review
10. Assignment

ASSIGNMENT SHEET 4-5-2
Hazardous Materials

A. Introduction

This material is to be completed prior to the material being covered in class.

B. Enabling Objectives

Refer to enabling objectives in Outline Sheet 4-5-1.

C. Study Assignment

1. Read Information Sheet 4-5-3

D. Study Questions

1. Why are explosives NOT classified as hazardous materials?
2. What does the four colors of the NFPA Diamond indicate?
3. What are the information that can be found in the MSDS?

INFORMATION SHEET 4-5-3
Hazardous Materials

A. Introduction

This information describes hazardous materials.

B. Reference

Introduction to Hazardous Materials A-493-0031
OPNAVINST 5100.19C
Basic Military Requirements NAVEDTRA 12043
Stowage, Handling and Disposal of Hazardous General Use Constables
NSTM Chapter 670
Engineering Administration NAVEDTRA 12147

C. Information

I. Hazardous material (HM or hazmat) - any material that is harmful to health or environment when improperly used or accidentally spilled.
   A. HMs are grouped into the following subcategories:
      1. Flammable and combustible liquids
      2. Toxic materials
      3. Corrosive materials
      4. Oxidizing materials
      5. Aerosol containers
   B. The following are not categorized as HM because they have their own specific instructions governing their control:
      1. Ammunition
      2. Weapons
      3. Explosives
      4. Propellants
      5. Pyrotechnics
      6. Chemical and biological warfare materials
      7. Pharmaceutical supplies
      8. Medical waste
      9. Infectious materials
      10. Bulk fuels
      11. Radioactive material
   C. Hazardous waste(HW) - any discarded hazardous material. Ships are required to transfer used or excess HM or HW to a Navy shore activity to determine its further use.

II. Precautionary labels shall be attached to each container of hazmat.
   A. Hazardous material containers must clearly identify the:
      1. material's name
      2. manufacture's name and address
      3. nature of the hazard presented
   B. If hazmat is transferred from one container to another, the new container shall be labeled in the same way as the old container.

III. The National Fire Protection Association (NFPA) diamond is used to visually present information of flammability, health, self-reactivity and special information about the hazard.
   A. Numbers from 0 to 4 are placed in red, blue, and yellow squares to show the degree of hazard present. The white square is used for special information.
   B. This information is used by firefighters to determine the equipment and procedures to use.
      1. Health hazards(blue square)
         a) 4-Deadly - too dangerous for firefighters. Normal breathing apparatus and protective clothing will not provide adequate protection.
         b) 3-Extreme Danger - indicates that the material is extremely dangerous. The area that it is in may be entered with extreme care.
         c) 2- Hazardous - Areas maybe entered freely with self-contained breathing apparatus.
         d) 1- Slightly Hazardous - Area maybe entered freely with self-contained breathing apparatus.
         e) 0- Normal Material - exposure to fire would offer no health hazard.
      2. Flammability hazards (red square)
         a) 4 - Below 73F - Very flammable gases or volatile liquids. If possible keep cooling water on containers. Withdrawal may be necessary
         b) 3 - Below 100F - Can be ignited under almost all normal temperature conditions. Water may be ineffective because of low flash point of material.
         c) 2 - Below 200F - Must be moderately heated before ignition occur. Water spray may be used to extinguish the fire.
         d) 1 - Above 200F - Must be preheated before ignition can occur.
         e) 0 - Will Not Burn

3. Reactivity(stability) hazards (yellow square)
   a) 4 - May Detonate - Likely to explode when heated. Too dangerous for firefighters to approach the fire.
   b) 3 - Shock and Heat may Detonate - May detonate when heated and under confinement. Too dangerous to approach but hose holders can be set up from behind an explosion resistant location.
   c) 2 - Violent Chemical change - Will undergo a violent chemical change with elevated temperatures and pressures. Use solid stream water from a distance to cool the material.
   d) 1 - Unstable if Heated - Normally stable but may become unstable in combination with other materials or at elevated temperatures and pressures. Use normal precautions when approaching.
   e) 0 - Stable - Does not produce any reactivity hazard.
4. Special information (white square) indicates specific types of hazards.

IV. Warning signs are used to warn personnel of a material's primary hazard rather than specific effects.
   A. Warning signs are classified into 1 of 9 hazard classes.
      1. Explosives
      2. Flammable gases
      3. Flammable and combustible liquids
      4. Flammable solids
      5. Oxidizers
      6. Poisonous materials
      7. Radioactive materials
      8. Corrosive materials
      9. Miscellaneous hazardous materials

V. Material Safety Data Sheets (MSDS) are technical bulletins provided by the manufacturer of the hazardous substance.
   A. They provide information about the material's:
      1. composition
      2. chemical and physical characteristics
      3. health and safety hazards
      4. precautions for safe handling and use
   B. You have the right to review a copy of the MSDS for any chemical material in your work area.
   C. The MSDS are broken down into sections
      1. Section I: Identification - Gives the product name and a description of the type of product.
      2. Section II: Composition - Identifies the hazardous chemicals contained in the product.
      3. Section III: Physical Data - Explains proper handling and emergency procedures.

4. Section IV: Fire and explosion data - Gives fire fighting guidance and warns of any unusual fire, decomposition, or explosion hazards.
5. Section V: Reactivity data - Describes the stability of a material under normal storage conditions.
6. Section VI: Spill or Leak Procedures - Gives instructions to handle spills and disposal of material.
7. Section VII: Health Hazard Data - Lists health hazards and a list of symptoms
8. Section VIII: First Aid - Gives medical instructions for each type of exposure hazard (i.e. swallowing or breathing)
9. Section IX: Special Protective Information - List equipment needed to handle the product without sustaining injury (i.e., protective clothing or respiratory protection)
10. Section X: Additional Information/ Precautions - lists any additional information.

VI. Hazardous materials must be stored in a HM locker or storeroom.
   A. Materials normally thought to be safe may be hazardous under certain conditions, therefore, they must be stored so that incompatible chemicals are separated.
   B. All HM containers will be checked for:
      1. Tightness of closure
      2. Corrosion
      3. Leakage
      4. Improper or inadequate labeling
      5. Expired shelf-life